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Growth of Single-Crystal Gallium Nitride

A method of preparing single crystals of gallium nitride (GaN) has been developed, using (0001)-oriented sapphire substrates, and strictly excluding oxygen contamination.

Oxygen contamination of GaN during growth has been overcome by using ultrahigh purity ammonia. This makes it possible to grow the GaN at temperatures as high as 825°C, at which point single crystal wafers are deposited on the (0001)-oriented sapphire surfaces. Wafers have been grown as large as one centimeter in diameter by several microns thick. They are the first single crystals of this material large enough to allow good electrical and optical characterization.

Single crystals of GaN may be made into electroluminescent diodes, useful throughout the entire visible spectrum, if the material can be made highly conductive p-type. Work on acceptor doping of GaN is continuing.

Notes:

1. Information on a related project involving indium-gallium phosphide electroluminescent diodes is contained in NASA Tech Brief 70-10474.

2. The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference:

NASA-CR-86192 (N69-33262), Vapor-Phase
Growth Technique and System for Several
III-V Compound Semiconductors

NASA-CR-110194 (N70-28838), Interim
Scientific Report No. 3

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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